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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/650,605	08/28/2003	Edmund O. Schweitzer III	1444-0003	8310

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EXAMINER	
HOANG, ANN THI	
ART UNIT	**PAPER NUMBER**
2836	

DATE MAILED: 11/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/650,605	SCHWEITZER ET AL.	
	Examiner	Art Unit	
	Ann T. Hoang	2836	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 August 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,5 and 7* is/are rejected.

7)☒ Claim(s) *3 and 6* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 January 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Fig. 2 is objected to as failing to comply with 37 CFR 1.84(p)(5) because it does not include the following reference sign(s) mentioned in the description of Fig. 2: 22, 25, 26, 27, and 29. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities: On page 1, line 30, the IEEE Standard has been misnumbered and should be changed to 738-1993. On page 2, line 38, the first author has been misnamed and should be changed to S.E. Zocholl. Appropriate correction is required.

Claim Objections

3. Claim 6 is objected to because the formula of the heat power supplied to the conductor = $I^2 \bullet (rac)+(TC-25) \bullet rdelt)+Q_{sun}$ is missing an open parenthesis character,

making the order of operations unclear. Formula (1) on page 3, line 6 of the disclosure is also missing an open parenthesis. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 2, 4-5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Griesemer et al. (US 2003/0146725) in view of Davis (US 4,806,855).

Regarding claim 1, Griesemer et al. discloses a protective relay system 10 using programmable logic present within the relay with the capability of constructing associated logic equations, comprising: a protective relay, which includes a programmable logic capability by which the end user of the protective relay can enter settings which are then used by the relay in carrying out its thermal protection functions; a set of stored thermal model equations which when solved emulate the temperature of a power line conductor, based on a plurality of individual setting values which are enterable into the relay by the end user, and wherein the logic and logic equations implement the entered setting values into the thermal model equations which produce an emulated temperature of the conductor; and means for providing an indication 56 when the temperature of the conductor exceeds a preselected value. The settings entered by the end user include the full load amperage (FLA) adjustment and a current sense input, among others, which are some of the factors determining the outcome of

the thermal model (see page 1, paragraphs 6 and 8). Page 3, paragraph 32 shows the main equation for constructing the thermal model, and it can be seen in Fig. 2B that the calculation of the thermal model involves a plurality of equations and iterations. Also see abstract; Fig. 1; pages 1-2, paragraph 17; page 4, paragraph 34; and claim 28. The protective relay system of Griesemer et al. is applied to thermal protection for motor coils and not power lines.

However, Davis discloses a system for rating power lines that models the thermal characteristics of the power line based on a set of stored thermal equations (1-5). See abstract and column 5, lines 1-8, in which an assumed conductor temperature-time model is disclosed. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a protective relay system with programmable input settings, such as that of Griesemer et al., in the application of modeling the thermal characteristics of a power line, such as that of Davis, in order to accurately calculate the temperature of the power line, based on user input data, and trip the power line relay upon overheating in order to protect it.

Regarding claim 2, Davis discloses the thermal model of the power line to be dependent on solar model values directed toward heating of the conductor affected by solar considerations, thermal model values which are determined from physical aspects of the conductor, and temperature values. It is disclosed in column 7, lines 19-23 that the thermal state of the power line conductor is defined by the ambient temperature, conductor temperature, solar radiation and line current. See columns 7-8 for formula variables and descriptions. It would have been obvious to one of ordinary skill in the art

at the time of the invention to make these variables the settings entered by the end user in order to model the thermal characteristics of the power line and calculate the assumed conductor temperature-time model based on these formulas.

Regarding claim 4, Griesemer et al. discloses the steps of checking the temperature of the motor coil represented by a thermal pile and providing an alarm but a do-not-trip mode upon the logic output exceeding a first threshold, and providing a trip signal for a circuit breaker upon the logic output exceeding a second threshold. See steps (236, 248, 252, 258) in Fig. 2C; page 4, paragraph 39, lines 24-39; and claims 28 and 36. The comparisons of the logic output to the first and second thresholds would necessarily involve a first and second comparator embedded in the computing circuitry. It would have been obvious to one of ordinary skill in the art at the time of the invention to perform this comparison method in the power line protective relay system in order to alert the user without tripping the relay during a case in which the system or process of applying power through the power line was more critical than the power line itself, and in order to trip the relay during a case in which continuing to apply power was not worth the expense of overheating the power line.

Regarding claim 5, Griesemer et al. discloses the calculation of a first order differential equation to model the real-time temperature of the motor coil (see page 1, paragraph 7). It appears that the settings entered by the user in the protective relay system for power line thermal protection of claim 1 would yield a model of the conductor temperature expressed as a first order differential equation in accordance with P-L=THC$\frac{dTC}{dt}$, where P is equal to the heat power supplied to the conductor, L is the

conductor heat losses, THC is the conductor heat thermal capacity and TC is the estimated conductor temperature.

Regarding claim 7, power lines, such as those disclosed by Davis, conduct over long distances and would necessarily require a distance relay, as opposed to a conventional relay used for smaller circuit applications, in a protective relay system.

Allowable Subject Matter

6. Claims 3 and 6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and edited according to the claim objection above. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 3, Davis discloses solar, thermal and temperature model values upon which a thermal model for a power line depends, including a solar absorption coefficient, the conductor diameter, the line resistance as a function of temperature, and the estimated ambient temperature. The prior art fails to teach the default solar heating value, the longitude of time standard, the longitude and latitude of the conductor, the temperature coefficient of the AC resistance, the thermal heating capacity, the thermal resistance to the ambient temperature, the estimated offset temperature, the high and low temperature thresholds, and the conductor initial temperature as being variables in a thermal model for a power line.

Regarding claim 6, the prior art fails to teach the heat power supplied to a power conductor to be $=I^2 \bullet (rac)+(TC-25) \bullet rdelt)+Q_{sun}$.

7. As allowable subject matter has been indicated, applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Seppa (US 5,559,430) discloses a system for modeling the temperature of a power line in order to determine the sag and prevent flashover to adjacent objects on earth.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ann T. Hoang, whose telephone number is 571-272-2724. The examiner can normally be reached Mondays through Fridays, 8:00 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus, can be reached at 571-272-2058. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PHUONG T. VU
PRIMARY EXA